No. 124 September 2005

solplan review

the independent journal of energy conservation, building science & construction practice

Inside . .

Integrated Mechanical Systems

From the Editor . . .

Recently we have been watching the devastation nature can cause. The southern US is familiar with hurricanes, so one would think that they were ready for them. Nevertheless, the intensity of the storms tested their state of emergency planning. It is also raising questions about whether the storms are evidence of climate change brought about by human intervention.

Climatologists will tell you that one or two incidents in one year are not enough evidence to prove or disprove long-term trends. Their models do, however, suggest that the number of storms, and their severity, will increase as global climates change. The insurance industry has already taken note of these signs, and their actuaries are acting on them.

In the face of the energy released by the big storms and their devastation, it is hard for an individual to understand how their individual actions might have contributed to conditions that could be generating them. After all, does that gas-guzzler by itself, or the extra energy used to heat or cool houses really amount to that much? On an individual basis, probably not. But multiply it by the number of vehicles, air conditioners, etc. and it quickly adds up. Walmart didn't become the retailing behemoth by selling high-end, high quality durable goods, but by constantly moving tons and tons of cheap stuff that ends up in a dump somewhere within a short time after its sale.

What we must also recognize is that much of the damage done was made worse as a result of our development patterns. I was astounded to learn that much of New Orleans lies below sea level, and not just a few inches, but up to 20 feet below sea level! The damage was made worse by the destruction of many coastal islands, waterways and tidal marshes that normally help to regulate storm surge and flood waters.

The US Army Corps of Engineers has been responsible for the building and operating of a large range of civil works projects to manage navigation and flood control throughout the US. Many of these, we are now learning, are having unintended consequences – worse than original problem they were trying to solve.

It is easy to sit smugly here in the north and take pot shots from the sidelines. But in the Vancouver area alone, we've allowed Richmond, a community of more than 170,000, people to grow on a prime agricultural river delta that is at sea level. If it wasn't for an extensive system of dykes to protect it from floods and high tides, the land would be inaccessible for long periods of the year. Winnipeg sits on a flood plain – the flood of a few years ago is not the first time it happened, and won't be the last. There are many other examples in Canada – including the homeowner who insists on that in-ground basement, even though it requires a bilge pump to keep it dry!

So what does this have to do with builders? We may be part of the problem! In our rush to provide housing needs, our development industry may often be taking the easy route, rather than the correct one. We need to reconsider our development patterns. Extensive sprawl contributes to the demand for gas-guzzlers that we need to get around in spread-out communities, and requires ever more oil. It contributes to pressure to push sprawl ever further out, into whatever land is easy to develop, and often that is not necessarily the most appropriate for intensive development with minimum environmental impact. We place too much development on vulnerable flood plains or prime agricultural lands, often because it is simply easier to do so. We encourage the draining of swamps to get more flat land that may be cheap to build on, ignoring the important wildlife habitat wetlands provide.

It's not too late to review what we are doing and where, and introduce a more sustainable development ethic.

Richard Kadulski,
Editor

solplan review
the independent journal of energy conservation, building science & construction practice

Editor-Publisher: Richard Kadulski
Illustrations: Terry Lyster
Contributors: Don Onysko, Jamie Glouchkow, Jim Gallagher, Martin Theriault, Bob Switzer, Rob Dumont, Jim Stewart
ISSN: 0828-6574
Date of Issue: October 2005
SOLPLAN REVIEW is published 6 times per year by:
the drawing-room graphic services ltd.
PO Box 86627, North Vancouver, BC V7L 4L2
Tel: 604-689-1841 Fax: 604-689-1841
e-mail: solplan@direct.ca
Street address:
#204 - 1037 West Broadway
Vancouver, BC V6H 1E3

Publications Mail Agreement No. 40013363
Postage paid in Vancouver, BC.
Return undeliverable Canadian addresses to
PO Box 86627, North Vancouver, BC V7L 4L2

SUBSCRIPTIONS: In Canada 1 year $50.29 (incl GST) (NB, NS, NF $54.05 includes HST); 2 years $90.95 (incl GST) (NB, NS, NF $97.75 includes HST). USA and other foreign payable in US $ 1 year $54.00, 2 years $98.00.

CHANGE OF ADDRESS: include a mailing label or copy all information off label for faster, accurate processing.
CONTRIBUTIONS: Unsolicited contributions and manuscripts welcome. Include self-addressed pre-stamped mailer if return requested. Publisher not responsible for loss or damage of same.
While every effort is made to provide accurate and complete information, we do not warrant or guarantee the accuracy and completeness of such information.
ADVERTISING POLICY: Publisher's discretion in the acceptance of any advertisement. No endorsement is stated or implied by the publisher.
PRINTED IN CANADA
GST Registration: R105208805
SOLPLAN is a registered trademark of the Drawing-Room Graphic Services Ltd.

Integrated Mechanical Systems

Integrated mechanical systems are designed to provide all the space conditioning a house needs through a single, coordinated system. They allow the designer to mix forced air and radiant floor heating, ventilation, cooling, and domestic hot water in one package. By combining the systems, there is the added efficiency of extracting the maximum amount of energy. For the homeowner, there is the added benefit of increased comfort.

Integrated mechanical systems have been around for some time, but they have relied on the knowledge and expertise of the system designer and installer, as components had to be accessed from many different sources. This can lead to frustration in getting a variety of products to work together.

The trend towards integration is now worldwide. In Japan, companies like Mitsubishi are producing heat pump systems that integrate space heating, domestic hot water and ventilation. But the capacity of these systems is low so they would not be able to meet the space- and water-heating needs in Canada. European manufacturers are also beginning to develop combination systems. However, their capacities and control systems are insufficient for the diverse weather conditions in Canada, and they typically do not include ventilation.

Integrated systems were a common feature in the Advanced Houses, a series of ten houses built across Canada in 1993. The goal of the Advanced House project was to advance the state of the industry by building homes that used at least 50% less energy than an R-2000 home, as well as incorporating the most resource efficient construction materials and practices. To achieve that level of efficiency required a well-insulated building envelope as well as efficient mechanical systems.

The integrated mechanical system was identified as one of the technologies worth encouraging. Consequently, Natural Resources Canada has helped industry develop the eKOCOMFORT® systems. eKOCOMFORT is not a single product, but rather a family of products from various manufacturers. The systems combine space and water heating with mechanical ventilation and meet stringent design, testing and performance standards set by the Government of Canada.

The eKOCOMFORT trademark is owned by the Government and is licensed to HVAC manufacturers. Licensing requirements include that they be willing to submit their products to independent laboratory testing based on industry established performance standards, and that the systems meet high performance standards.

For the designer and mechanical contractor, an integrated mechanical system takes away the complication of making purchasing decisions on five or six individual products and the risk that they might not work effectively together. By having a simple, single warranty, the eKOCOMFORT system takes away the problems of dealing with multiple manufacturers for separate appliances, all with different warrantees; only one call is needed for service under one warranty.

There are savings to be had for the homeowner too. In today's homes, furnace and ventilation fans typically run continuously to provide fresh ventilation air. Together the power consumption of conventional equipment is the equivalent of operating five or six 100-watt bulbs year round. This is not only wasteful, but throws unneeded heat into the home at times when it is not needed – and in fact contributes to the cooling load in homes with cooling needs. eKOCOMFORT systems can cut this waste significantly, since all fans use high-efficiency variable-speed or ECM motors.

While the hardware price is competitive with a separate furnace, hot water tank and heat recovery ventilator, and the installion is simplified because there is a single gas connection, one combustion vent, one electrical connection, simplified duct connections and easy set-up.

A complete integrated system addresses one of the challenges many builders face today – how to incorporate a continuous ventilation system in a cost effective manner. Too often, the ventilation system is left out as a perceived superfluous cost. With the eKOCOMFORT system, continuous, fresh air is guaranteed. Every system includes a complete heat recovery ventilator,

which, together with a low-energy consumption fan, provides continuous, energy-efficient ventilation and complete distribution to all areas of the home.

A number of manufacturer teams are participating in the eKOCOMFORT initiative. Some are still at the prototype development stage, others have systems now entering the market.

Ecologix Heating Technologies, Cambridge, Ontario
(519) 658-4330
www.ecologix.ca

Ecologix manufacture the combo-pac and combo-pac handlers air handlers and radiant floor modules that are a portion of the ekocomfort system. Their units can be tied to a variety of water heaters.

Kerr Heating Products
info@kerrheating.ns.ca
www.kerrheating.com

Kerr Heating Products of Parrsboro, Nova Scotia is an ISO 9001 registered manufacturer of heating equipment. They produce oil, gas, and wood-fired furnaces and boilers and oil storage tanks. A number of their oil-fired boilers are Energy Star rated, with efficiencies up to 88%.

Nu-Air Ventilation Systems
(902) 757-1910
www.nu-airventilation.com

Nu-Air Ventilation Systems of Newport, Nova Scotia, manufactures residential and light commercial ventilation equipment from 85 cfm to 2700 cfm.

The Enerboss is an advanced combination system air handler with an integrated heat recovery ventilator. When coupled to a boiler or hot-water heater, the unit provides space heating and ventilation to the building. An optional evaporator coil can be added to connect to a compressor to meet cooling loads. A ½ hp electrically commutated direct drive motor handles circulation and ventilation. The energy-efficient blower is designed to provide continuous ventilation at 65 cfm (30 l/s) and circulating air at 350 cfm (165 l/s). The same blower also provides fresh air to the heat recovery ventilation system. A separate blower provides HRV exhaust.

IBC and Nutech

This is a team effort combining the efforts of two companies, one with an expertise in water heating, the other in ventilation products.

IBC Technologies Inc.
(604) 877-0277
www.ibcboiler.com

IBC have developed high-efficiency, wall-mounted condensing boilers with an AFUE exceeding 91%. The boilers utilize automotive-type sensors to control air-fuel mixture over a range of different firing rates. The boilers use sealed combustion, PVC venting and stainless-steel heat exchangers.

Their boiler units are being prototype tested with several eKOCOMFORT boiler / modified fully modulating ECM airhandler / plus indirect DHW tank systems.

Nutech Energy Systems
(519) 457-1904
www.lifebreath.com

Nutech Energy Systems Inc., is an ISO9001 registered company based in London, Ontario, that produces the LIFEBREATH® family of products. In addition to the widely used heat recovery ventilators and energy recovery ventilators (HRVs and ERVs), Nutech also produces the Clean Air Furnace®, which combines an HRV core with a fan coil. They are supplying the customized integrated air handler unit for this team.

Tirino Corp.
Tel: (905) 669-8636
www.tirino.ca

Tirino's existing products are based on self-contained, integrated space-heating and hot-water systems. Their unit will operate at about 85 % efficiency with an input capacity of 110,000 Btu/h, and will utilize side-wall venting. The unit has an air handler with integrated HRV system and space-heating coil to provide space-heating output of 65,000 Btu/h. A GE ECM will be used in the air handler and provide continuous balanced ventilation

---

Vebteck, Nutech and Fleetline

The AquaMaster Q100 provides space and domestic water heating as well as continuous mechanical ventilation. Radiant in-floor heat, air conditioning and air filtration are easy options. This system has a high efficiency boiler that is available for use with natural gas, propane or oil. It is the first fully integrated system commercialized by an eKOCOMFORT manufacturer. It is the result of a joint development effort from Vebteck Research, Nutech Energy Systems and Fleetline Products.

Vebteck Research
(905) 479-4048
www.vebteck.com

Nutech Energy Systems
(519) 457-1904
www.lifebreath.com

Fleetline Products Ltd.
(519) 756-5700
www.fleetlineproducts.com

Fleetline Products Ltd. of Brantford, Ontario, manufactures residential water heating boilers.

NY Thermal Inc. (formerly New Yorker Boiler Company and NY Thermal)
Tel: 506-432-1130
www.nythermal.com

Manufacturers of hydronic heating equipment and furnaces. For oil, gas and wood. Although they are not part of the formal eKOCOMFORT initiative, they do make units with microprocessor controls to achieve high efficiencies, and that can be integrated.

Gas-Fired Combo Heating System Performance

Natural-gas fired combination water-heating/ space-heating systems, usually called "combo-systems," consist of a hot water tank connected to an air handler/fan coil to supply both forced-air space heating and domestic hot-water heating.

Different manufacturers often supply combo system components and installation practices are variable–often relying on the expertise of the installer. These systems are rapidly gaining a share of the residential market even though there is still little infrastructure to support their design, installation and servicing.

This is one of the rationales behind the eKOCOMFORT® initiative, where a number of manufacturers are combining forces to develop modular packages that incorporate heating, hot water and ventilation. Prototype packages are already on the market. The eKOCOMFORT packages will simplify product access as well as after-sales service and warranty issues.

Although there are standards for evaluating individual components used in combo systems, there are no specific standards to assess the systems' combined performance and no comparisons to other traditional heating methods.

A joint CMHC and IRC research project was aimed at establishing performance benchmarks for different types of residential combo systems. Its objectives included:

- Developing testing procedures for combo systems;
- Benchmarking the performance of a power-vented water heater with an air-handler unit (a typical combo system);
- Benchmarking the performance of a high-efficiency combo system – for example, a high-efficiency, condensing water heater with an air-handler unit; and
- Comparing the performance of the combo systems to each other and to a separate high-efficiency furnace and conventional, power-vented water heater.

Two combo systems were evaluated. One was a conventional, power-vented water heater, the second had a high-efficiency condensing water heater. The water heaters were integrated with an air-handler unit with a rated output of 21.4 kW (73,000 Btu/h). Both systems were evaluated in the laboratory to compare their rated efficiencies with actual performance.

To evaluate the performance of the systems, the Canadian Centre for Housing Technology twin-houses at the National Research Council were first benchmarked under identical conditions and then a single element was changed in the "test" house. Throughout the experiments, the reference house operated a high-efficiency condensing furnace and a conventional power-vented water heater. The test house operated under the same conditions throughout the benchmarking period.

Return and supply air temperatures, water temperatures, water flow rate, electrical consumption and gas consumption were monitored in both houses, and operation efficiencies were calculated on a daily basis.

The combo water temperature was set to approximately 60°C (140°F) for both combos, and a common mixing valve was installed on the hot water supply line of both systems and set to 50°C (122°F). The benchmark hot-water heater was set to 50°C (122°F). The total daily hot water draw was approximately 276 l (60.7 gal.); this assumed a standard, simulated shower, clothes washer use, dishwasher, bath and kitchen tap draws.

Halfway through the test period, an adjustment was made to the air-handler airflow rate in the test house to improve the heat exchange effectiveness of the air-handler coil. The airflow rate at heating speed was increased from 344 l/s (730 cfm) to 566 l/s (1200 cfm). The combo systems were compared at the two speed settings.

Observations

Combo 1 (using a conventional, power-vented water heater)

Increasing the airflow rate through the heating coil in the air circulation duct showed no change in gas consumption. The space-heating load did not affect domestic hot water availability. Supply water to the mixing valve during water draws was between 50°C (122°F) and 58°C (136°F) in most cases.

House space-heating was satisfied during the test period, maintaining house temperatures near the thermostat set point on even the coldest days.

The conventional water heater of this combo system gained efficiency when there was both a water and space-heating load. The combined efficiency was highly dependent on the relationship between space- and water-heating loads – ranging from 55 percent on warm days to 80 percent on the coldest days. In warmer weather, this combo system outperformed the benchmark configuration.

Combo 2 (high-efficiency condensing water heater)

Increasing the airflow rate through the heating coil in the air circulation duct provided greater savings in energy consumption compared to the low airflow configuration. Hot water draws were handled without any significant drop in water temperature – supply water to the mixing valve during water draws was between 52°C (125°F) and 57°C (134°F).

The highest efficiencies were achieved when the only load was for water heating when undiluted, cold supply water condensed more out of the combustion products than the warmer water returning from the air handler.

The performance of this system was comparable to that of the high-efficiency furnace during heavy space-heating demand (combined efficiency of 85 percent). In milder weather, this system outperformed the reference system in total system efficiency. The difference was largely attributable to differences in the efficiencies of the two water heaters.

Throughout the project, both combo systems were able to satisfy the space heating and water heating demands of the test house. In terms of energy use, Combo 2 (high-efficiency condensing water heater) outperformed Combo 1 (conventional, power vented water heater) by about 12 to 14 percent. The Combo 2 system also surpassed the Combo 1 system in satisfying simultaneous demands for space heating and hot water. This superior performance was attributed to the higher heat output of the burner and the narrower deadband of the water-heater aquastat.

The calculated efficiencies for the two combo systems during heavy space-heating demands were well in line with the combined annual efficiency (CAE) claimed by the manufacturers. Laboratory and field tests demonstrated that combo systems can meet real-life demands for combination space- and water-heating loads in a house. ☼

Assessment of the Energy Performance of Two Gas Combo-Heating Systems. *The full report on this project is available from the Canadian Centre for Housing Technology at http/www.ccht-cctr.gc.ca*

Effects of ECM Furnace Motors on Electricity and Gas Use

Electronically Commutated Permanent Magnet (ECM) motors are brushless, permanent-magnet DC motors with integrated controls. ECMs are significantly more efficient than the Permanent Split Capacity (PSC) motors used in most residential furnaces today.

Modern airtight houses require continuous circulation to distribute fresh air throughout the house, which is when the benefits of ECM motor technology are most apparent. During continuous circulation, PSC motors are usually set to half speed, which is provides an airflow that often is much higher than required for proper ventilation. For PSC motors, half speed is not the same as half energy, because the motor becomes less efficient at reduced speeds.

Because the ECM motor is more efficient, less electricity is required to do the same work, so less heat is released from the fan motor into the air stream and thus into the house. To compensate, it is presumed that during the heating season there may be a slight increase in gas consumption, but during the cooling season there may be a decrease in air conditioning electrical consumption over and above the direct electrical savings in fan motor consumption.

An evaluation of the impact of ECM motors on electrical and gas energy use was done at the Canadian Centre for Housing Technology (CCHT) in Ottawa in 2002. The project not only evaluated the performance of ECM motor technology in forced-air heating and cooling applications, but also quantified the increase in natural gas consumption during the heating season and the decrease in air conditioning during the cooling season.

To determine the effect of any new technology tested, the CCHT twin houses were first benchmarked under identical conditions and then a single element was changed in the test house.

For this study, the original ½ horsepower PSC motor in the test house furnace was replaced with a ½ horsepower ECM motor. Return and supply-air temperatures, motor surface temperature, motor electricity consumption, gas consumption, airflow and rpm were monitored in both houses.

For heating, both houses used a standard, mid-efficiency gas furnace with a rated output of 12.9 kW (44,000 Btu/h). For cooling, the air conditioner had a rated output of 7.8 kW (26,700 Btu/h). The same furnace distributed air to the house. For both cooling and heating, the furnace fans ran continuously, operating at a higher speed when the furnace was firing or the air conditioner was running.

In order to take full advantage of the ECM motor, researchers set its circulation speed as low as compatible with good circulation and air quality. The ECM motor's higher speeds were set to match PSC airflow rates as closely as possible.

HOT2000 energy simulation software was benchmarked against the test results and then used to project the results to an entire year for a variety of houses and furnaces in four Canadian cities: Winnipeg, Toronto, Ottawa and Moncton. The different house types modeled were: R-2000, typical new, typical existing, typical row and typical row with 1/3-horsepower fan motors. Houses with and without air conditioning, and with and without constant air circulation were considered.

Some of the major findings were:

- During the heating season tests, average furnace motor electrical consumption was reduced by 74 % (to 2.38 kWh/day from 9.29 kWh/day) helping to reduce electrical consumption for the whole house by 26 % to 19.1 kWh/day from 25.9 kWh/day.
- The lower electrical consumption of the ECM motor resulted in an average increased gas consumption of 29.71 MJ/day or 13.9 % because the furnace had to make up for the cooler, more efficient motor that wasn't throwing off heat.

However, during the cooling season, use of the ECM motor resulted in 48 % savings in furnace-fan motor electricity consumption, and four percent additional savings in electrical consumption for the air-conditioner compressor, an overall savings of 14 %, since the cooling didn't have to deal with the excess heat given off by the motor.

- Projecting these results to a full year suggests that the test house would save 2,854 kWh/yr in electricity, while consuming an additional 184 m^3 of natural gas, giving a net savings of about $158 a year. Results also predict that coal-fired electricity emissions are reduced by 2,786 kg of CO_2.
- The highest net saving for a household is in an energy efficient home, like an R-2000 house. Electricity savings from an ECM motor are smaller in less-efficient houses, both as kilowatt hours per year and as percentages of furnace electricity because the heating and cooling systems in these houses are running for longer periods of time, causing the ECM motor to operate less time in circulation mode where its benefits are greatest.
- Increases in annual natural gas consumption from the ECM motor are higher in less-efficient houses. Savings of electricity are more than 1,000 kWh/year in all cases, ranging from 12 to 18 % total savings for houses without air conditioning, and from 17 to 25 % total savings for houses with air conditioning.
- The increased use of natural gas due to an ECM motor is greater than 100 m^3 in all cases – ranging from 4.7% in a typical existing house with high-efficiency furnace in Ottawa, to 9.7 % in R-2000 and row houses with medium-efficiency furnaces in Moncton.
- The benefits of an ECM motor are greatly reduced when it is not run continuously. In all cases, switching from a PSC motor with no circulation to an ECM motor with continuous circulation would result in at most a small increase in cost ($5.14 per year) and small savings on average.
- ECM motors have the biggest impact in houses where the furnace fans are operated in continuous ventilation mode. These benefits apply across the entire range of locations, house types and furnace types. ECM motors will definitely reduce the demand for electricity and should reduce peak loads during both the heating and cooling seasons. The ECM motor offers a unique fuel-switching opportunity – natural gas at close to 90 % efficiency displacing significant amounts of electricity.
- However, the indoor air quality in most forced warm-air heated houses could be improved with an ECM motor with no increase in utility bills (as compared to PSC fan motors without continuous circulation) by maintaining continuous air circulation. ☼

Testing Combined Heat and Power Systems

The rolling brownouts in California, the blackout in eastern North America in August, 2003 and the sharp increase in the cost of oil and natural gas are beginning to generate serious interest in alternative approaches to power generation. At a larger scale (such as a cluster of buildings on a school campus or in a neighbourhood), combined heat and power (CHP) systems, such as fuel cells or micro generators, offer opportunities for recovery of the heat generated when electricity is produced to provide hot water and space heating to the buildings. These systems can be scaled down to a residential scale. One to ten kW of electrical generating capacity may be one way of providing backup power to grid-connected houses or primary power to remote communities where grid connection is not practical or cost efficient.

The Canadian Centre for Housing Technology (CCHT) at its twin-house research facility tested the potential for micro systems by testing a natural-gas fuelled Stirling engine. The prototype unit had a thermal output of 6.5 kW and was controlled by the heat demand of the test house while producing up to 700 W of electricity as a by-product.

In order to integrate the combined heat and power unit, the electrical system in the test house had to be modified so that the generator could provide electricity to both the house and the power grid when house loads were less than the CHP electrical output. Added components included: additional wiring, two way meters, safety switches and power-quality meters. The cost of the electrical modifications to an existing house was estimated to be $2,000 to $3,000.

The heating system also had to be adjusted so that there was a heat management and storage system to collect, store and use the heat from the CHP to meet the house space-and water-heating loads. This included a hot-water storage tank, a hot-water heater, an air handler, pumps, piping and controls.

The overall performance of the CHP system compared favourably with the efficiency of gas-fired combination space- and water-heater systems. Total efficiency of the CHP unit tested was 82 percent, with an average 6 percent of input energy going to electricity generation and 76 percent for heating.

The heat storage and distribution system designed for this demonstration averaged 57 percent efficiency – but better optimization of the heat management and storage system could reduce standby heat losses and improve the overall efficiency.

Although the Stirling engine CHP unit was installed with the primary purpose of demonstrating the test facility, the researchers note that its performance through the demonstration showed promise and merits follow-up work.

A number of issues still must be resolved before combined heat and power systems can become commonplace,. Local utilities must accept the concept of reversible meters to accept electricity back into the grid on a micro level. Currently, only BC Hydro has a policy for reversible meters for small photovoltaic solar systems, although other utilities are considering it. In other parts of the world, including much of the US, reversible meters are fairly common.

Other issues include:

- The Canadian Electrical Code requirement for an "external, weatherproof, lockable disconnect" must be reviewed.
- The cost of the CHP unit itself is a deterrent – current models cost about $9,500. This cost would be reduced by widespread adoption of the technolog, and mass production.
- There are issues relating to the reliability, durability and value of the electricity generated.
- The length of the long warm-up period following a shutdown before the CHP unit can resume generating electricity can be as much as 30 minutes.
- The design and control of heat storage and distribution to minimize shutdown of the CHP and maximize the overall efficiency.
- The role of a heat-driven CHP unit in the summer, when the thermal load is small and heat losses of the system into the house are relatively high.
- Whether or not a backup burner (in the form of a water heater in this project) is needed to address all space-and water-heating loads of the house. ☼

Development of Micro Combined Heat and Power Technology Assessment Capability
at the Canadian Centre for Housing Technology
By Mike Bell, Mike Swinton, Evgueniy Entchev, John Gusdorf, Walter Kalbfleisch, Roger Marchand, Frank Szadkowski
www.ccht-cctr.gc.ca

Moisture in Wood Foundations

There are thousands of preserved-wood foundations (PWF) in Canadian housing and in most the bottom wood plate may have a moisture content over 20%. It is the wood preservatives that have prevented the wood from rotting as a result of this relatively high moisture content. However, while the wood has been protected from decay, the high moisture levels may have led to mould growth on other materials in wall cavities.

The owners of an Ottawa-area house discovered significant mould in their ten-year old split-level, wood foundation house. It was severe enough to affect their health. The evidence seemed to indicate that mould growing inside the fibreglass-insulated basement wall cavities might be the source of the problem, even though the wall cavities were covered with a polyethylene air-vapour barrier and, in most areas of the basement, the wall was finished with drywall. The homeowners could observe condensation and mould growth within the cavities in the wall sections that had plastic but no drywall. They opened the basement wall, removed the batt insulation and cleaned out the mould. Then they needed a permanent solution.

The foundation was built in accordance with the CSA PWF standard. Foundation walls were 2 x 6 treated studs, with a 2 x 6 treated bottom plate on a 2 x 10 pressure-treated foundation plate. There was apparently no capillary break between the two plates, which is not a requirement of the standard. The exterior sheathing was pressure-treated plywood, with a polyethylene membrane up to grade. A treated plywood skirt overlapped the polyethylene membrane for the above-grade portion on the foundation. The foundation was sitting on a gravel bed and a sump and pump in the lower basement level kept the water table below the footings.

For new foundations, careful attention to site drainage, as well as use of foundation drainage materials should help reduce the moisture loading on the foundation wall. Foundations should never be installed in high water table areas.

Exterior foundation drainage membranes were not widely available at the time the CSA PWF standard was drafted, so there is no mention of them – just a sheet of polyethylene protection on the outside face of the plywood, but when drainage membranes are installed in combination with a well drained foundation, they should reduce the potential for high moisture content in the house.

While the measured moisture content of the studs was in the 7 - 10% moisture content range, the plywood at the bottom of the wall and the plate was between 15 and 25%. This higher level of moisture in the wall plate is not unusual in PWF. An earlier PWF survey of more than 40 houses found that the mean base plate moisture content was 22%

Several options were considered for refinishing the walls. Exterior insulation of the PWF was favoured by several building scientists, but the homeowners did not want the disruption that would be caused to exterior decks and landscaping, difficulties in protecting the above-grade insulation, and the projected cost. A compromise solution was to re-insulate the cavities with cellulose insulation, but leave a vented cavity with two exhaust fans at the base of the wall. This is similar to the sub-slab depressurization systems used for radon mitigation. A fan creates a negative pressure in the vented cavity with some airflow through it to aid in drying and to isolate the occupants from potential biological growth in the cavity. Emissions or particulate from any mould growth that might occur would, in theory, be vented outside and should not affect the quality of the indoor air.

Two 47 l/s (nominal) exhaust fans were installed: one for each basement level, with exterior louvers to keep rodents out. The base cavity and baseboard were done with a 1 ½" space between the baseboard and the faces of the PWF studs. With both fans operating at full rated power, the differential pressure between indoors and outside was measured to be about -10 Pa.

When the flow in each exhaust fan was reduced to 24 l/s, the average depressurization in the basement of the house was reduced to -5 Pa. The HRV operation did not seem to be affected; the heating system and combustion air intake was electrically powered. The wood stove or fireplace in the living quarters had not experienced back-drafting up to this time at the higher exhaust rate.

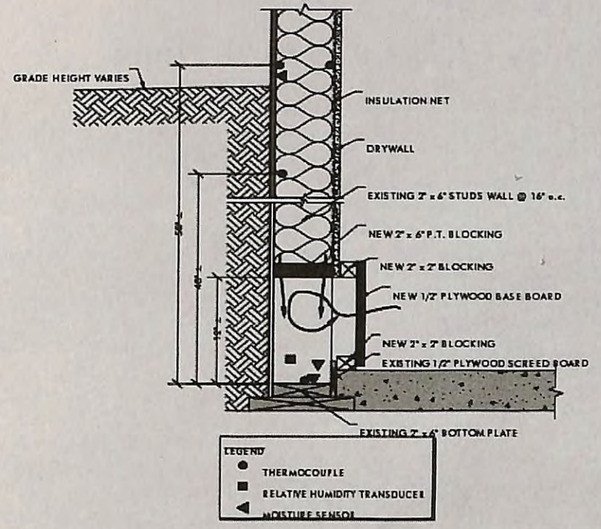
It is important to remember that moisture, both in the ventilation cavity and in the walls themselves, can enter at different times of the year and for different reasons. During cold weather, moisture from indoor air being drawn into the wall cavities by the exhaust system may condense on the cold plywood sheathing and inside the insulation. It may also diffuse directly through the drywall and insulation to condense on the plywood. In the summer, exterior moisture may enter through defects in the plywood skirt, or be driven inward by sunlight to condense on the cooler inside of the inner wall facing or diffuse through the drywall to the interior. It is also possible for indoor moisture to diffuse into the plywood where the ground has been frozen deeper than at other locations.

The moisture content in the plywood was observed to be high and prolonged in an area where an outside deck protected the soil from direct sunlight. The moisture content reached a peak at the beginning of April but dried rapidly my mid May. This area probably experienced relatively deep frost penetration. It was noted that there were two vents in the wall under the deck, but their function was not clear. However, because the wall was depressurized by the wall the exhaust system, it is possible that outside air could have been drawn in if the vents were not well sealed to the wall.

The moisture content in the bottom plate and lower portion of wall studs were in the range of 18 to 25%.

Ten-mil polyethylene sheeting was used to hold the blown cellulose where no drywall had been applied to the walls. In the walls with polyethylene only, there was little condensation on the back of the plywood during winter. Some condensation took place on the back of the treated plywood where the unfinished drywall was used. It is believed that the majority of this moisture was the result of air drawn through the wall. While the moisture appeared to dissipate fairly quickly, once spring arrived the exact mechanism for removal of moisture – diffusion, redistribution or airflow – is not known, as this was a limited study.

The use of an unpainted drywall inner liner without a vapour barrier resulted in more accumulation of moisture in the plywood above grade. The rate of drying appeared to be slower than where polyethylene had been used. However, if a greater quantity of moisture had accumulated, it would take longer to dissipate under identical conditions.



The primary conclusions drawn from this project are:

1. An exhaust ventilation system to prevent the build-up of excess levels of moisture in the lower part of the PWF can be successful, although there was some moisture accumulation in the above-grade portion that dissipated when spring arrived.
2. Wetting of the basement walls by rain hitting the upper portion of the PWF appeared to have occurred at a few locations. The plywood skirt was poorly installed and the caulking used to seal the top of the skirt was deteriorating. A properly flashed and protected skirt would reduce such incursions of moisture.
3. The cavity depressurization strategy worked well at isolating the occupants from air in the wall cavities.
4. Based on relative-humidity records, it appears that wetting of the base of the foundation occurred at all locations in the summer. The bedrock is very close to surface in this area. However, the moisture content was low (under 26%). The system cannot prevent wetting; it can only facilitate drying. ☼

Cavities of Preserved Wood Foundations
By Don Onysko, Gerald Van Rijn, Daniel Gates, and Don Fugler. Paper presented at the 10th Canadian Conference on Building Science and Technology, Ottawa, May 2005

You Asked Us About: Energy Efficient House Plans

Since you wrote the Solplan books a few years ago which featured several house plans, I was wondering whether you might have any stock plans for super-insulated small houses. I am looking for plans for my new retirement home.

I want it to be small and environmentally appropriate. I've been looking through plan books and the Internet, but with limited success. When it comes to insulation, I feel that one can't go overboard and I'd like to use double-wall construction (like the Saskatchewan Conservation House), trusses for the roof system in order to pack in more insulation, and so on.

Have things changed a great deal since the Solplan books were published? Don't you see a horrendous, nearly frenzied interest in the topic just around the corner?

Somewhere we still have copies of the plans, but they would need to be updated to meet new standards. There are many plan books on the market. If you find something that suits your site, that works for you from a design and functional point of view without requiring significant changes, that would be an economical way to get a house design. The house details can always be reviewed and the specifications modified to upgrade the house's performance. A qualified builder and a consultant review of specifications and details can develop the documentation package needed to build your home.

If the house design in the plan book needs many changes to make it work, then a custom design would be the better way to go. As an architect, I would be remiss not to mention that. It all depends on your desires, needs, and site conditions and to a much lesser extent, project budget.

However, it is important to be clear on what your goal actually is. What are the functional needs? What are the site conditions? What level of energy efficiency do you want to achieve? What are the green building objectives you have in mind? The minimum standard to consider is the R-2000 Standard. By having a licensed R-2000 builder build your house for you, you also get the benefit of third-party quality assurance and inspections to ensure that the set targets are met. In addition, there are programs such as Built-Green in Alberta, and soon in BC, that also provide guidance on resource efficiency issues.

As to insulation levels, you can go overboard. Windows still represent the equivalent of a thermal hole in a wall. No matter how well insulated the wall is, you will not get its full benefit unless you also address the type and performance of the windows. In most of southern Canada, a well-insulated wall, easily built, would be something like 2x6 (R-20) plus 1 1/2" of styrofoam sheathing. That would give you a wall with an R-value of around R-25.

On the other hand, a double-glazed window with low-e glass and argon fill may have an R-value of around 3. Before investing in extensive upgrades to walls, always consider what you can do to improve the windows. Windows should always be the highest performance that you can get and be reasonably sized. If you really want to achieve very low energy use in the house, windows should be triple glazed, double low-e, with insulating spacers, argon fill in a fibreglass frame. Of course, as far as possible, the windows should also be located in the house in such a way that they maximize useable solar gains to provide free energy, and to minimize heat loss (which is what happens on the north side).

High performance windows may be pricey, but they will definitely have more of an impact on the overall energy consumption of the house than an extra six inches of insulation on the walls.

The house is a system – so you need to keep in mind that all its elements are interrelated, and when you upgrade one area, other areas need to be reviewed. Some energy efficiency upgrades may be easy to do but they may not have a big impact on the total house. This means that packing extra insulation in the ceiling doesn't always return much improvement for the investment.

The foundation must also be well insulated – this means that foundation walls need to be fully insulated and the basement floor also needs to be fully insulated under the slab.

Only when all the building envelope upgrades have been considered, should you look at the mechanical systems and what may be the best way to provide any needed additional heating.

Once you have a design, the best thing is to do an energy analysis – that would help identify where you want to spend money on upgrades, or what level of insulation is desirable. Today, this is easy and not that expensive, and would help finalize construction details and specifications. R-2000 builders are familiar with HOT-2000 which is the software used to determine compliance to the R-2000 Standard. It can also be used to help you optimize the home's construction elements. It will also tell you just how much heating may be needed. After all, it is possible to design and build houses that don't really need a furnace – even in many parts of Canada.

Have things changed since we first published the Solplan books? Yes, definitely. We now have high-performance windows, heat-recovery ventilators are readily available and widely used, high-efficiency heating equipment is readily available, higher efficiency water heaters are coming onto the market, and through the R-2000 program, we now have excellent software that can be used for accurate energy simulation of houses. A large number of builders in Canada have received R-2000 builder training, so even if they don't build certified R-2000 homes, they have been influenced by them and have improved their work. In addition, blower doors (to test how airtight a homes is) are widely used, not just for new construction, but also for diagnosing existing houses.

Our first books featured easy-to-use worksheets to calculate heat loss and solar gains. These were considered unique, but then they were written in the days before the availability of personal computers; before everyone had a couple of computers to their name. An easy-to-use worksheet was a valuable tool. At the time we started, an electronic calculator was the state-of-the-art in high technology. Techies in high school and university still used slide rules and log tables! Gads - makes me sound like an old fogey! It sounds like pre-history, but I started to write the books in 1977.

Will there be a frenzied rush and a rekindled interest in the topic of energy efficiency? That is hard to say. The average new home today is much more energy efficient and getting more so every day. In 1977, a fully insulated 2x4 wall in the Vancouver area was the exception (R-8 was considered well insulated). In colder parts of Canada, a 2x4 wall with R12 was the norm. Sealed double-glazed windows were in their infancy, and on the mild West Coast arguments were trotted out why double-glazing didn't make any economic sense. Low-e was an exotic innovation at best, and not readily available.

We are seeing significant incremental change in the mainstream. Initiatives such as the Energuide program for new houses (to label houses and encourage better construction) are certainly going to move the general construction industry to improve performance even further. ☼

NRC·CNRC

2005 National Construction Codes Now Available

By Martin Thériault and Jim Gallagher

The printed versions of the 2005 National Building Code, National Fire Code and National Plumbing Code have just been published by the National Research Council in a new "objective-based" format.

Readers of ***Solplan Review*** who have followed the codes process over the past ten years will know that the publication of the new codes is the culmination of an extensive review that followed the 1995 editions. Countless hours of work by industry and provincial/territorial representatives, in collaboration with the NRC Institute for Research in Construction, have produced the new editions which not only contain numerous technical changes but significant new information to help users understand what must be done to satisfy code provisions. This new information will make the codes clearer, easier to apply to existing buildings and more accommodating to innovation by assisting designers (architects and engineers) in proposing "alternative solutions" to code requirements if they wish to do so.

At the same time, many industry people, such as builders and contractors, should experience little change from the way they previously used the codes. For their day-to-day work the 2005 codes have essentially remained the same: they will find the same code provisions as they found in the 1995 editions, except that these provisions are now referred to as "acceptable solutions."

New Organizational Layout

In order to accommodate the new information that embodies and constitutes the objective-based format, the three codes have been reorganized. Each comprises three divisions: **A, B and C.** Divisions A and B are of greater interest for users, with Division B holding the most similarity to the 1995 editions.

Division B contains all the technical provisions, now known as acceptable solutions. For most projects, builders and contractors and others will likely use Division B because they are familiar with the provisions that have been in effect and proven to work for many years. What is more, the code structure and vocabulary that users are familiar with will remain in place. This ensures a business-as-usual scenario for those who wish to stick to the tried and true.

For those who wish to work with their clients to develop innovative designs and approaches (alternative solutions), **Division A** is the part they will use to assess whether the alternative solution provides equivalent performance to the technical provisions of Division B. Division A includes compliance options and new information called "Objectives" and "Functional Statements." The objectives describe the overall goals that a code's provisions are intended to achieve; for the National Building Code, for example, these objectives are safety, health, accessibility, and fire and structural protection of buildings. Functional statements describe the functions that a building must perform to fulfill the objectives. Most of the provisions in Division B will be linked to at least one objective and one functional statement in Division A to help designers and regulatory authorities better understand the reason why a particular provision must be met and to help them evaluate alternative solutions.

Division C contains administrative provisions, which have all been consolidated into this one place from the 1995 codes.

The process of using the objective-based format will be greatly facilitated when the CD-ROM versions of the codes are released in early 2006. Also to appear on CD-ROM will be User's Guides to all three codes, containing the intent and application statements. The CD-ROM versions will enable users to navigate back and forth easily between the various parts of the codes and access the information they need to help them develop alternative solutions. The User's Guides will be available only on CD-ROM, with the exception of the one pertaining to Structural Commentaries (NBC, Part 4, Division B).

Some of the Technical Changes

Close to 1,300 technical changes have been incorporated into the 2005 codes to address the many technological advances and health and safety concerns raised since the 1995 editions were published. Below are a few of the most significant changes in the 2005 NBC, Part 9, Housing and Small Buildings.

Application of Part 4 versus Part 9 structural requirements. Changes have been made to clarify when Part 9 applies, when Part 9 loads can be used for design under Part 4, and when the design must be done under Part 4.

Simplified snow load calculation. The application of the simplified calculation has been expanded beyond wood-frame construction to include other structures with a high degree of redundancy created by closely spaced, repetitive members. An additional limit on application is that the roof area of the structure does not exceed that permitted for Part 9 buildings, regardless of whether the building is constructed with firewalls or not.

Support of decks. Several changes were made to clarify the requirements for foundations and lateral bracing for decks, and to identify exceptions and acceptable solutions.

Insulated concrete form (ICF) walls. Prescriptive requirements for engineered insulated concrete form walls for small houses have been added. These requirements apply to both foundations and above-ground walls.

Precipitation protection. In order to better protect residential buildings from rain and snow, a new climatic indicator, the moisture index, has been adopted to identify regions of high moisture loads. It is now explicitly stated in which locations across the country cladding is required to be installed over a capillary break (open rainscreen principle). In addition, new requirements for flashing were introduced to describe the constructions in more detail and in which cases they apply.

The National Research Council, in collaboration with the provinces and territories, will help users understand the technical changes in the codes through seminars being organized in major cities across Canada. These seminars will review the most significant technical changes in the three new codes. The provinces and territories will work together to develop training with regard to the objective-based format of the new codes.☼

Martin Thériault is the communications officer with the Canadian Codes Centre, Institute for Research in Construction (IRC), National Research Council. Jim Gallagher is Manager of Publication Services at IRC.

To order the 2005 National Construction Codes, readers can visit the NRC Virtual Store at www.nrc.gc.ca/virtualstore. Further information on the new codes and the upcoming NRC seminars are available at *http://www.nationalcodes.ca/*

IRC Seminars on Technical Changes to 2005 National Building Code

The introduction of a new edition of the National Building Code (NBC), the first new one in ten years, will require users to get acquainted with the changes it contains. Significant this year is the reorganization of the NBC into an objective objective-based code.

The printed version of the code document is now available. The CD version, which will make it easer to work with the code objectives of the code, will be available early in 2006.

Numerous seminars will be developed and delivered by various code user groups. The Institute for Research in Construction, in coordination with the provinces and territories, will offer seminars in 16 cities across Canada to explain the technical changes embodied in the 2005 versions of the National Building Code, the National Fire Code and the National Plumbing Code. Technical advisors from the Canadian Codes Centre will review the most significant technical changes in the three codes, as well as providing provide a brief introduction to the new objective-based format.

The content will be covered over two days. Participants will have the option to register for all or parts of the seminars, according to which topics are of interestof interest to them.

Registration information is available on the national codes Web site: *ww.nationalcodes.ca/seminars*

IRC Code Seminar Dates:

Ottawa	Dec 5 - 6 2005
Fredericton	Jan 10 - 11 2006
St-John's	Jan 12 - 13 2006
Charlottetown	Jan 16 - 17 2006
Halifax	Jan 18 - 19 2006
Yellowknife	Feb 14 - 15 2006
Edmonton	Feb 16 - 17 2006
Saskatoon	Feb 20 - 21 2006
Winnipeg	Feb 22 - 23 2006
Toronto	March 8 - 9 2006
Whitehorse	March 21 - 22 2006
Vancouver	March 23 - 24 2006
Victoria	March 27 - 28 2006
Calgary	March 29 - 30 2006
Quebec	April 4 - 5 2006
Montreal	April 6-7 & 10-11 2006

Energy Answers

Rob Dumont

What country in the world is doing the most with innovation in renewable energy?

Recently my family and I visited Germany, traveling from Berlin in the Northeast down to Freiburg in the Southeast. One striking new part of the landscape is the renewable energy presence. Wind installations are seen throughout the countryside. Germany is now the world leader in wind-electric installations, with 16,628 megawatts installed as of 2004. By comparison, Canada had 444 megawatts of wind installations, less than 3% of Germany's capacity. The next nearest country to Germany is Spain, with 8,200 megawatts installed. Germany currently gets about 6% of its electricity supply from wind. An impressive 38,000 people are already employed in their wind industry.

Germany has no extensive land below sea level like New Orleans, but it too has been hit by climate change this year. Extensive flooding occurred in the southern part of the country in the latter part of August this year. Unlike the United States, however, Germany is aggressively doing something about the root causes of climate change, investing heavily in renewable energy systems to displace fossil fuel consumption and greenhouse gas emissions. The goal, says Jürgen Trittin, Germany's environment minister, is to continue "making Germany the world leader in alternative energy and in taking action against global warming."

Wind is not the only renewable energy investment visible in Germany. Very large numbers of solar electric systems and solar water heaters are evident on houses and barns throughout the country. I even saw a Mercedes Benz plant near Stuttgart with solar heating panels on it.

Renewable energy sources are expected to power 20% of the country by 2020, and one plan has Germany getting 50% of its total energy supply from renewables by 2050. As regards the Kyoto target of an 8% cut in emissions by 2012, Germany has already achieved a 19% cut, admittedly in part due to the shutting down of energy inefficient factories in the former East Germany. However, the renewable energy investments such as wind and solar have greatly aided in achieving, indeed overachieving, the Kyoto target.

Coupled with its renewable energy policy is a serious conservation effort. Germany, with a population of 82 million people, has the fifth largest economy on the planet and a standard of living measured in purchasing power parity that is within 10% that of Canada. Yet its per capita oil consumption at 12.8 barrels per person per year is about half of Canada's, and its per capita electricity consumption at 6300 kilowatt-hours per year is 58% less than Canada's. While it is true that Canada is a much larger and somewhat colder country, the percentages of people who live in urban areas in Canada are comparable to those in Germany.

Energy efficiency is especially visible in Germany's transportation system. I had the privilege of travelling on an ICE (Intercity Express) train to Frankfurt at speeds up to 300 km/h. Germany's train system is clean, on-time, has newer equipment, and, unlike Canada's train system, is a serious part of the transportation system. SMART cars, the energy efficient two-seater vehicles produced by Mercedes Benz, are widely seen in urban Germany, and land use policy discourages urban sprawl.

How did Germany get such a lead in renewable energy? The Red-Green alliance of the Social Democratic Party and the Green Party has been the prime mover in developing a regulatory and incentive framework that makes renewable energy installations possible. According to Michael Levin, a free-lance journalist in Berlin, "A key feature of the energy act is its 'feed-in tariff' which stipulates a fixed, higher price paid by transmission companies to producers of renewable fuels for every kilowatt-hour of clean energy they feed into the grid. The extra cost is then tacked onto consumers' monthly energy bills. The genius of the subsidy is that it forces consumers, not companies or the government, to foot the extra direct cost of producing renewable energy – but at a price they hardly feel.

"For example, the average German household today pays an extra 0.4 cents per kilowatt-hour of electricity it receives from wind, adding a modest total of about $17 to the yearly power bill. By 2020, renewables are expected to power 20% of the country, and the consumer household tax is likely to rise one cent per kilowatt-hour or less – a cost that economists say will hardly be felt, thanks to improvements in energy use and efficiency."

One dark spot in the sunny outlook for renewable energy in Germany is a possible change of government. If the Christian Democrats (CDU) form a government, they will likely reduce the incentives for renewable energy. If there is a "grand coalition" of the opposition CDU and the current governing Social Democrats (SPD), legislative gridlock may well block any further renewable energy initiatives. ☼

Technical Research Committee News

Canadian Home Builders' Association

Drywall detailing in wet rooms

Bathrooms are the rooms where the highest humidity levels in a home are generated, on a regular basis. They are usually the warmest room, at least for a time when a bath or shower is being taken. The moisture level will be quite high, until the tub, shower and towels dry. How long this fakes will in part depend on how well ventilated the bathroom is. This means that the vapour pressure on the bathroom wall can be quite high, which is why a good air and vapour barrier in the bathroom is important. Yet that is one area where the air barrier detailing is done poorly, especially if the bathtub is installed against an outside wall.

A fairly standard practice is to apply a polyethylene sheet to be both an air and a vapour barrier over the insulation, and then cover that with drywall and ceramic tile. However, according to the Gypsum Association's publication GA 216 (section 15.3.1) "Gypsum panel products used as a base for tile or wall panels in wet areas shall not be foil-backed or shall not be applied over any vapour retarder."

It does create a dilemma for builders using polyethylene as both the vapour barrier and air barrier, since there will be a discontinuity between the poly air barrier and the drywall backing for the tile, which can be the air barrier if detailed properly. If the poly is stopped on the stud where tiled wall starts, then there is no discontinuity in the vapour barrier. The wall cavity vapour barrier shifts to the surface vapour barrier from there on. However, special attention must be given to the air sealing at that point.

At the same time, there is a need for vapour diffusion retarder to prevent excessive moisture migration into the wall by diffusion, since there can be a large vapour pressure pushing the vapour outward. Both the green board (water resistant gypsum board) and the cement board used in bathrooms are open substrates with a permeance in excess of 20. If the adhesive or mastic being used has a permeance of 1 or less for the thickness used, the combination will act as a vapour retarder. If the permeance is in the range of 5-10, then there will be vapour diffusion.

As for as cement board, it does require a vapour barrier behind it, and will not be compromised, because the cement board transmits water readily, so the wall cavity behind has to be protected against this moisture.

While glazed ceramic tile itself is a good vapour barrier, the overall quality of the vapour barrier system provided by the tile surface may be questioned due to the presence of grout lines. Grout lines are normally quite permeable. How well they are sealed will have a bearing on how much diffusion might take place through the wall.

Looking for Information?

You've encountered a problem, and need answers. Where do you find answers? Who can you turn to? Manufacturer's technical sales representatives might have some answers if it relates to their product. If it's code related, your local building official may have an answer, or the provincial agency responsible for the Building Code may have some answers. Maybe a building science consultant might be able to help. If it's more general, or if these cannot give you the information, or are not available, there are other sources.

CHBA National office has staff that could help you. The Technical Research Committee web site has information (on the members access portion) about current projects underway: dealing with technical research; code and standards work; and technical advice and publications. There is also a listing of recently completed projects, and where to access their results. It could be that answers to your concerns today may available – it's just a matter of getting at the information.

Not to be forgot is the Canadian Housing Information Centre at CMHC. The library is a wealth of information. It is the most comprehensive housing library in Canada, with not just technical but also social and marketing research information. For information:

Fax (613) 748-4069;
toll free phone 1-800-668-2642.
Email: chic@cmhc-schl.gc.ca

The Technical Research Committee (TRC) is the industry's forum for the exchange of information on research and development in the housing sector.

Canadian Home Builders' Association,
Suite 500, 150 Laurier Ave. West, Ottawa, Ont. K1P 5J4
Tel: (613) 230-3060
Fax: (613) 232-8214
e-mail: chba@chba.ca
www.chba.ca

Upgrading Louisiana

Harold Orr, the retired building scientist from Saskatchewan, has pointed out that there is going to be a lot of remedial work to fix all the flood-damaged homes in Louisiana. He points out that this provides an opportunity to not just rebuild homes to make them habitable, but also to upgrade the energy efficiency, since most will be stripped to the bones to dry out the building materials. At this stage, upgrades will be relatively inexpensive and the retrofitted homes would have lower energy bills and help address climate change.

Harold is trying to spread his idea to decision makers and opinion makers. If anyone has any contacts in the US, or who wishes to pursue this, can spread his idea.

If anyone wants to follow this up with Harold Orr, they can contact Rob Dumont at the Building Performance Divison of Saskatchewan Research Council.

Fax:306-933-7446
e-mail: dumont@src.sk.ca

Being Resource Efficient

It seems that everything today is over packaged. Walk into any store and you're confronted with everything in a blister package with extra stuff included. Sometimes the value of the packaging is more than the value of the product being sold!

Construction materials are not immune to this. In some cases, packaging is necessary to protect expensive finishing materials. But at other times the packaging serves little purpose. At worst, this amounts to selling more stuff than is needed because it may be more convenient to deal with one item rather than two.

Recently I got a call from a Vancouver heating contractor who was upset because of the attitude displayed by his supplier. He needed a basic fitting, but was offered a matching fitting with extra parts that were not needed. He was told that if he wanted just the basic unit, he could just strip off the unwanted parts and throw them away. If he really wanted only the basic fitting, he would be charged significantly more than for the more complex fitting, and it would be a special order.

On the other hand, when he ordered a water heater from IBC, a local manufacturer of tankless, gas-fired heaters, he was asked whether or not he needed the unit to come in packaging. Since it is a piece of mechanical equipment that is going to be installed immediately in an out-of-the-way location, there was no need for packaging. After all, it's not a showpiece appliance in the centre of the home. When he got his unit, it came along with a small gift.

The manufacturer saved himself the cost of packaging, the contractor didn't have unneeded waste to deal with, and there was less waste to handle – whether by the city (in the case of a retrofit) or the contractor in the case of new construction.

Construction is the single largest source of waste materials, yet we know that it doesn't have to be that way. If we are to improve the environment and reduce excessive resource extraction, we need to get more aggressive in dealing with waste generation. In parts of Europe, manufacturers are already required to deal with the consequences of their products at the end of their useful life. In some places, shoppers have been known to remove excess packaging and leave it at the store rather than taking it home. ☼